RHIC CNI update

- Still searching for the origin of large discrepancy between injection to flattop measurements

  i.e. In BLUE injection → flattop
  - radial component fluctuate around 0 → certain size in minus
  - X90-X45 consistently plus → statistical fluctuation
- Something has been changed (or shifted) during ramp process

  possible candidates are many,
  - Beam size, timing (flattop is earlier by 7nsec), luminosity, beam position
  - Accordingly banana cut, target position, etc
- Anyway, the balance of the detector distribution is changed after the ramp, and we want to see them in the form of bunch crossing dependence (-t dependence was already done)
- Need to combine some runs to get rid of statistical ambiguity

$$\sum N_{ij}(injection) / \sum N_{ij}(flattop) \qquad i = \text{detectors} \;\; j = \text{bunch}$$

- To eliminate the common structure by fill dependence, this ratio is normalized by total ratio i.e. (By Si-1 was also studied)

$$\sum_{i=1,6} \left(\sum N_{ij}(injection) / \sum N_{ij}(flattop) \right)$$

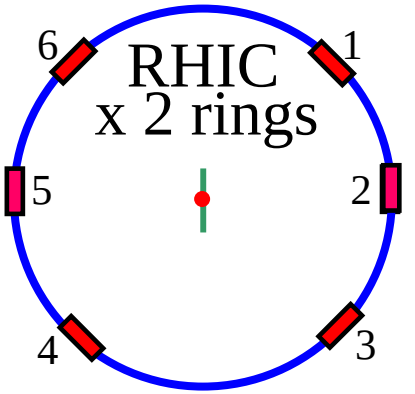
Double ratio distribution

- What we are supposed to see ?
  - (injection/flattop[1st]) for *i*-th / (injection/flattop[1st]) *total*
  - Luminosity asymmetry is cancelled out
  - Polarization effect is cancelled out in first order, but remains as a bunch structure, if there is a large depolarization from injection to flattop, i.e.

    (40% / 30%) / (nearly zero in total)

    so on the right hand detectors, we will see (+)→up, (-)→down

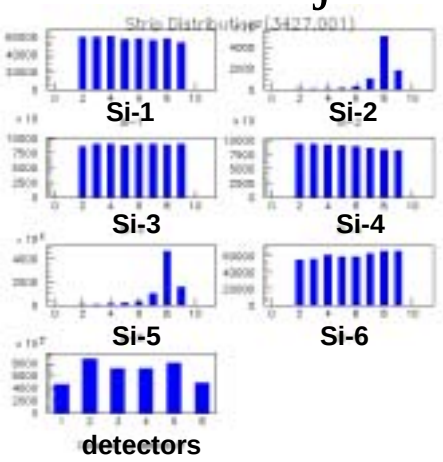
    on the left hand side, (+)→down, (-)→up



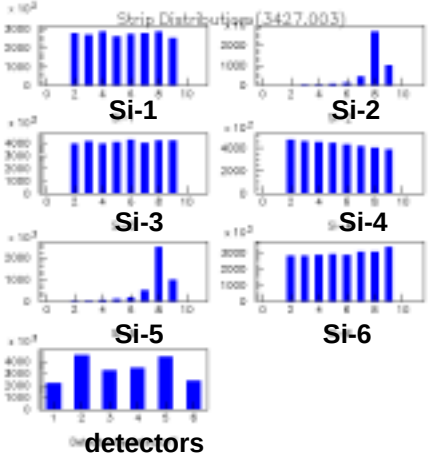
BLUE strip distributions

- Only the vertical3 target is not longitudinally centered wrt the Si's

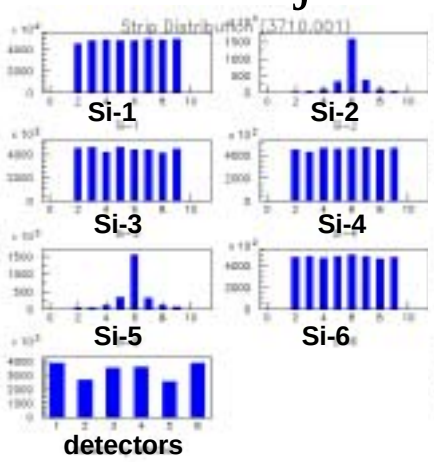
Vert3.Inj



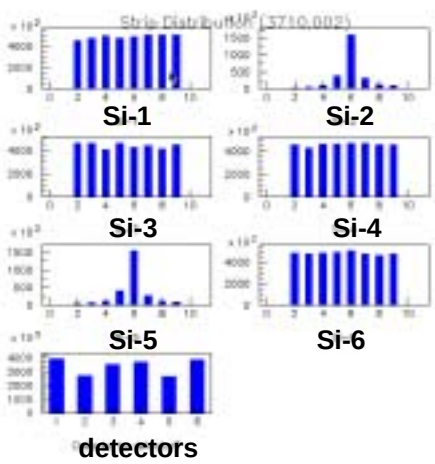
Vert3.Flat



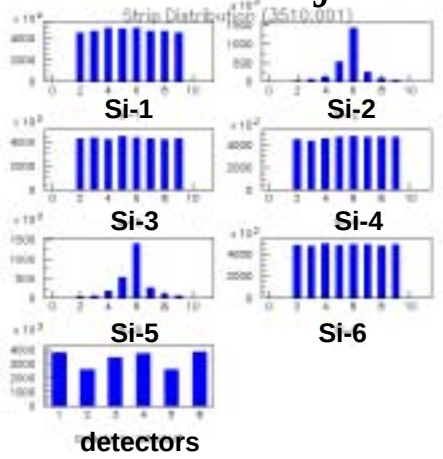
Vert2.Inj



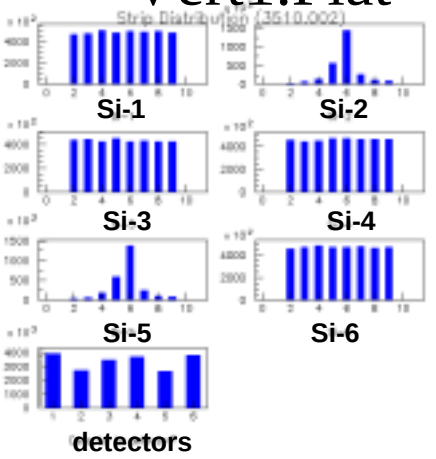
Vert2.Flat



Vert1.Inj



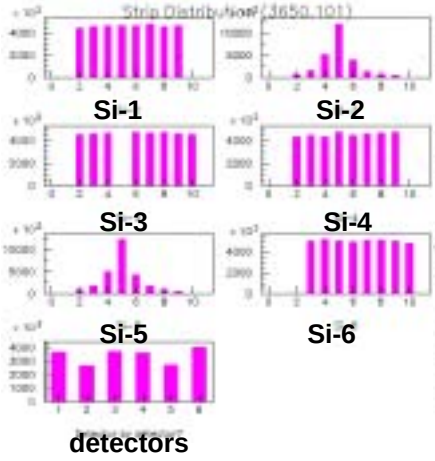
Vert1.Flat



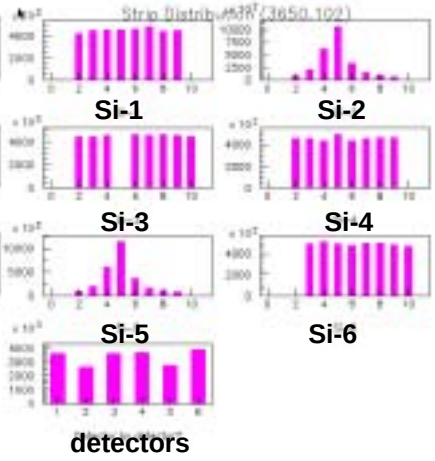
target		Start	End
Vert3		Beginning	Apr15
Vert1		Apr15	May14
Vert2		May14	May18

Yellow strip distributions

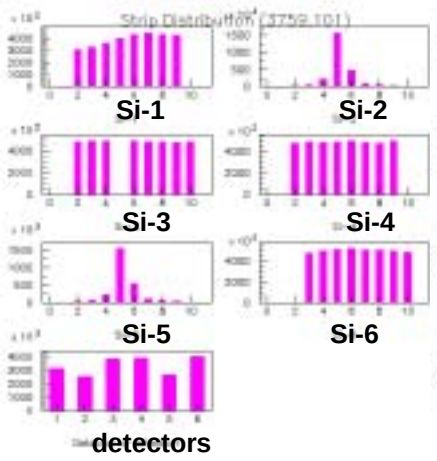
Vert3.Inj



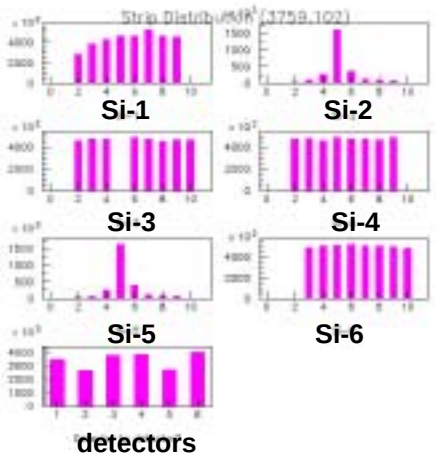
Vert3.Flat



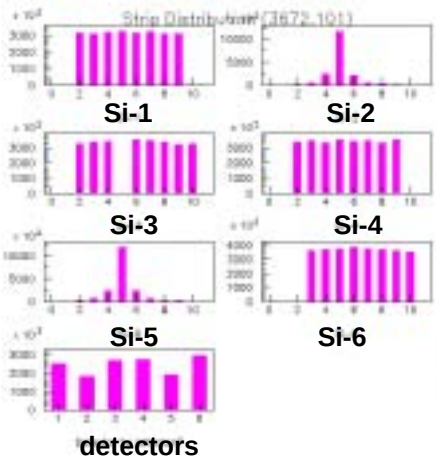
Vert2.Inj



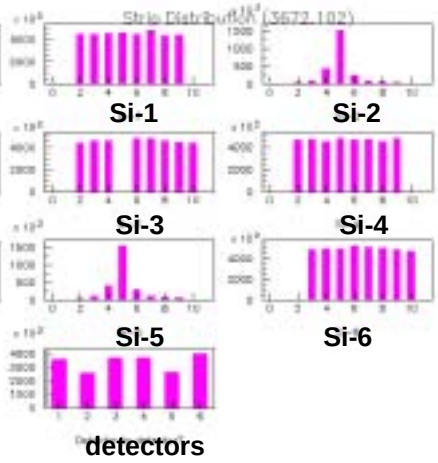
Vert2.Flat



Vert1.Inj



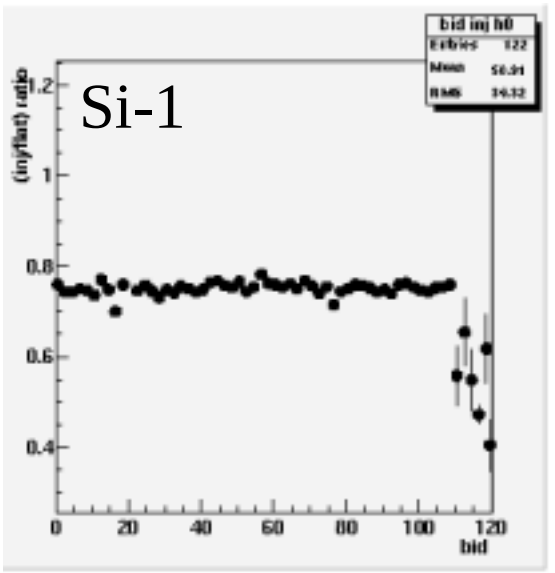
Vert1.Flat

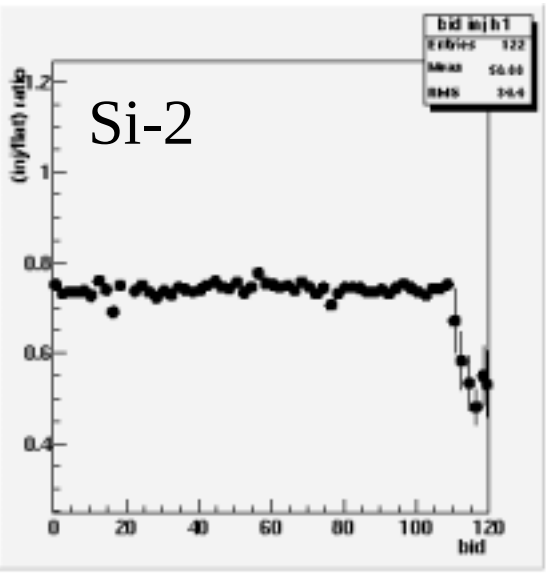


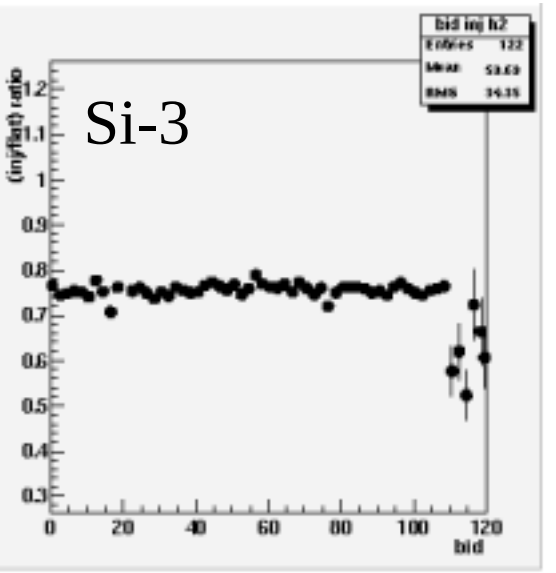
target		Start	End
Vert3		Beginning	May8
Vert1		May9	May15
Vert2		May21	May25

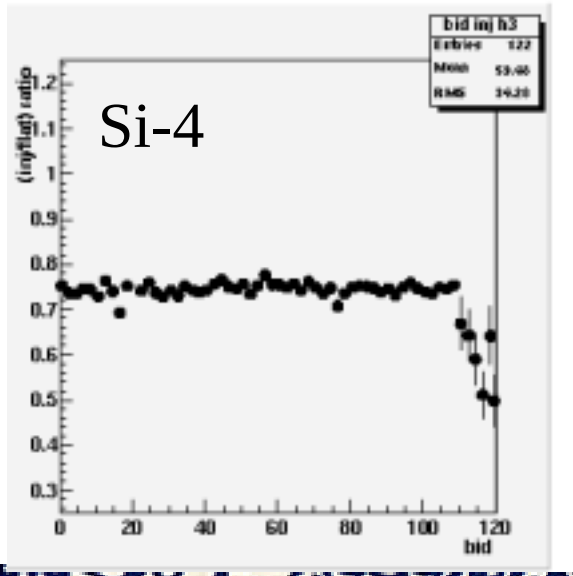
Blue injection/flattop(1st) w/o normalization

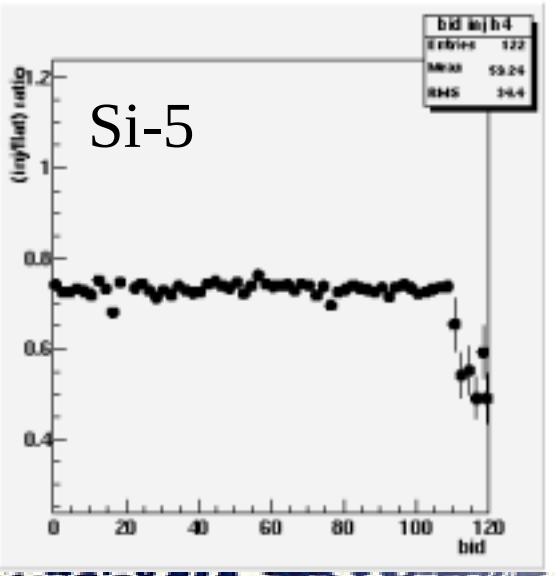
- Vertical 2
- Spin pattern +-+-+-
- 10/10 runs
- ***No Normalization***

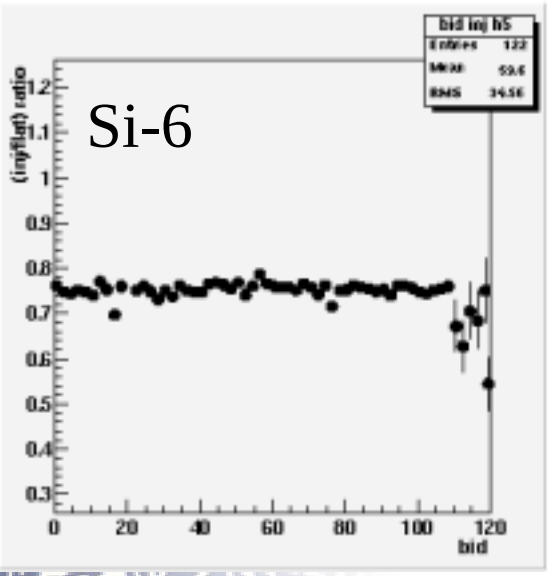






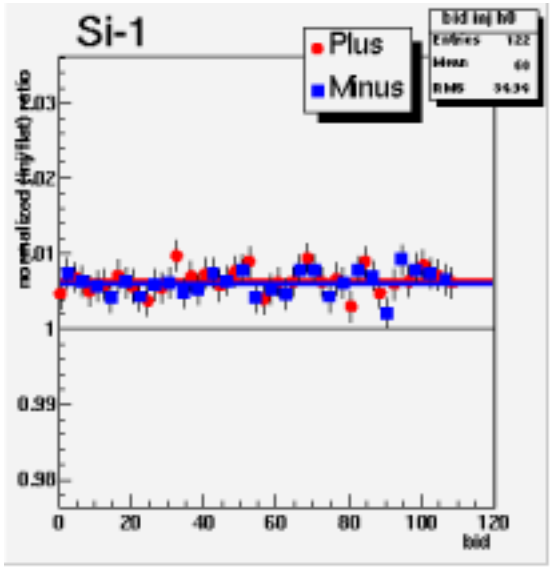


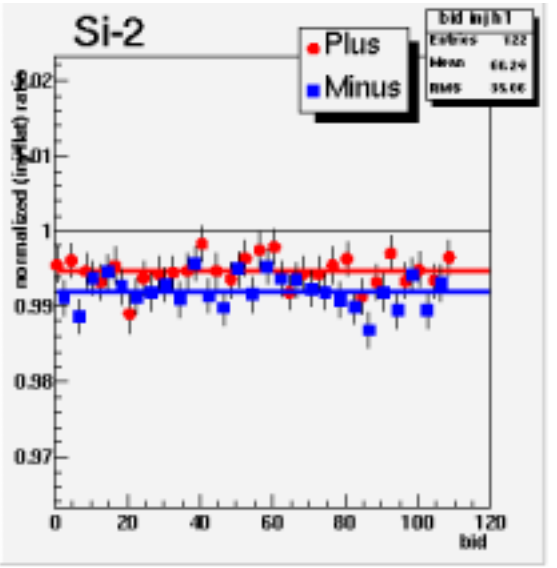


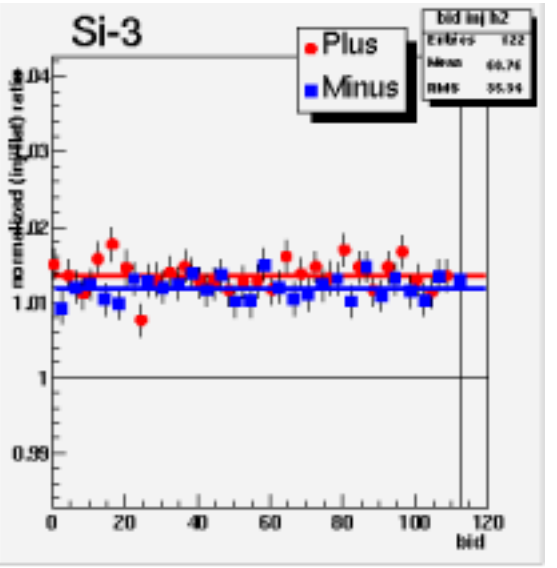


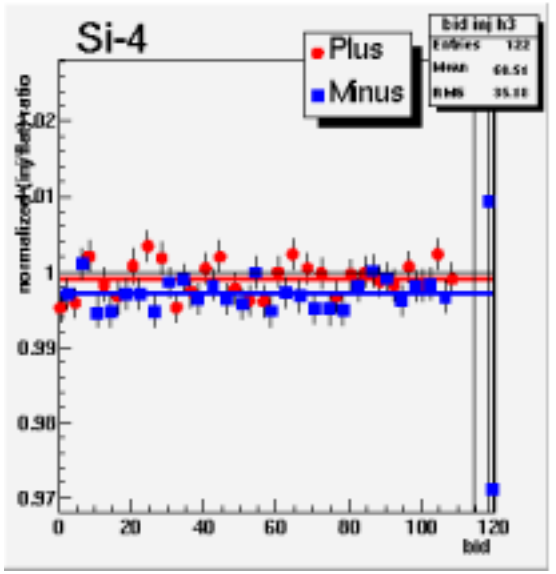
Blue injection/flattop(1st)

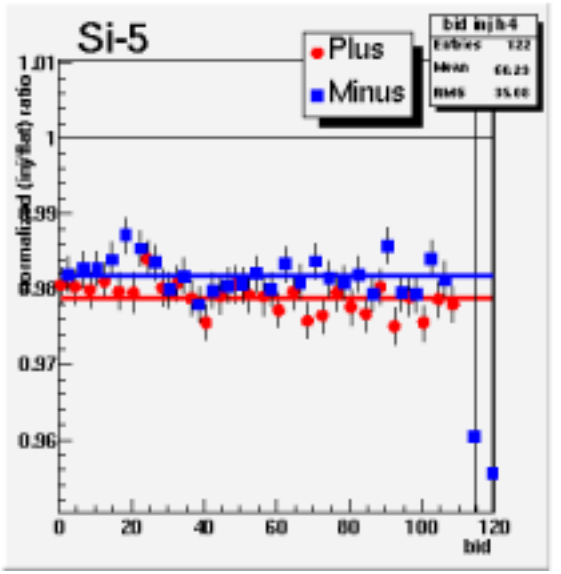
- Vertical 2
- Spin pattern +-+-+-
- 10/10 runs
- ***Normalized by total Si***

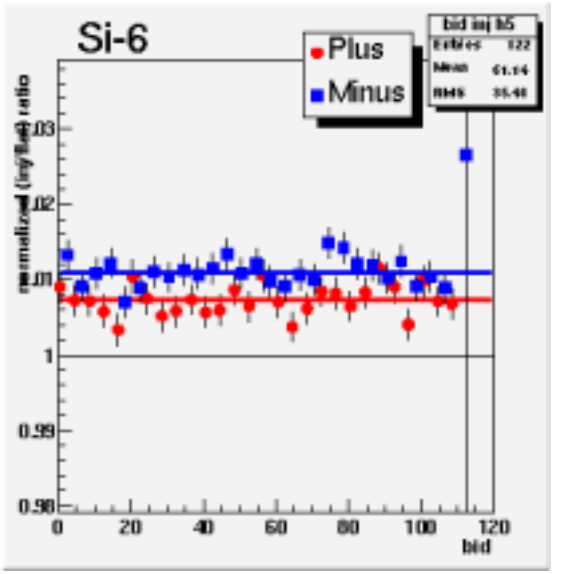






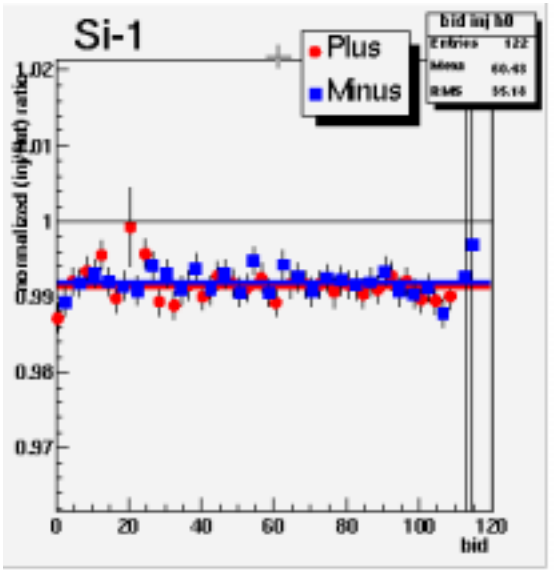


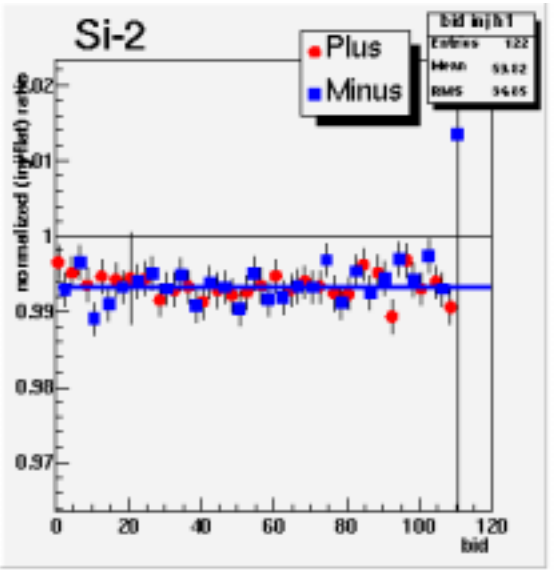


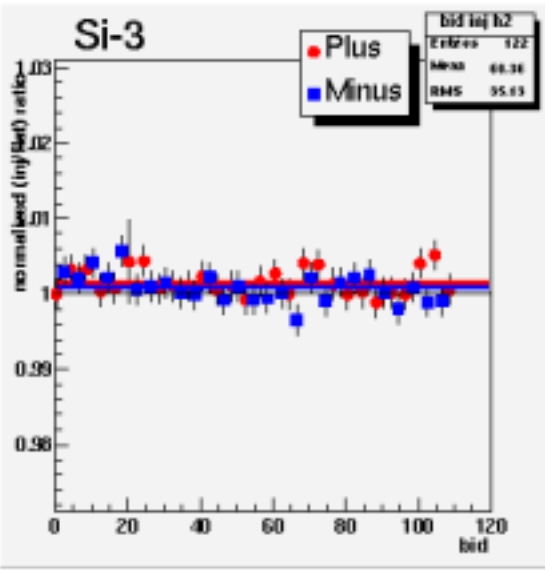


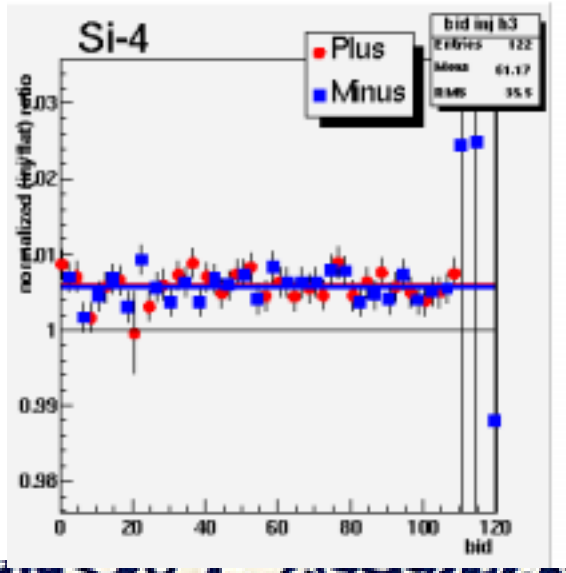
Blue flattop(1st)/flattop(2nd)

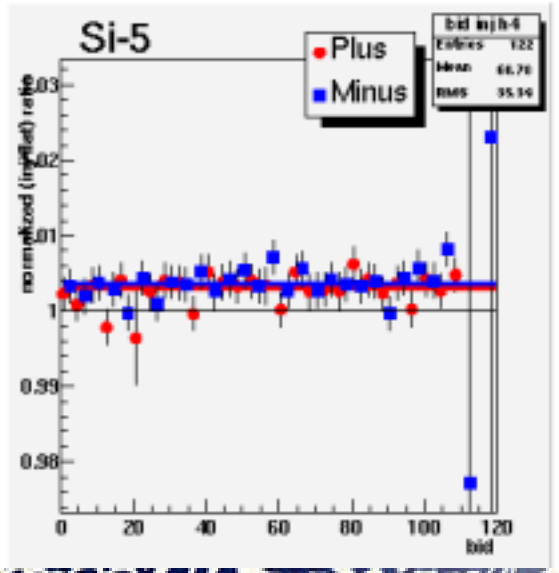
- Vertical 2
- Spin pattern +-+-+-
- 10/19 runs
- ***Normalized by Total Si***

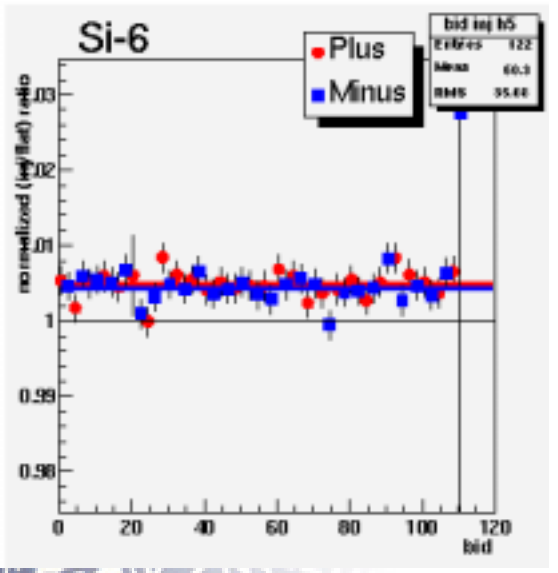






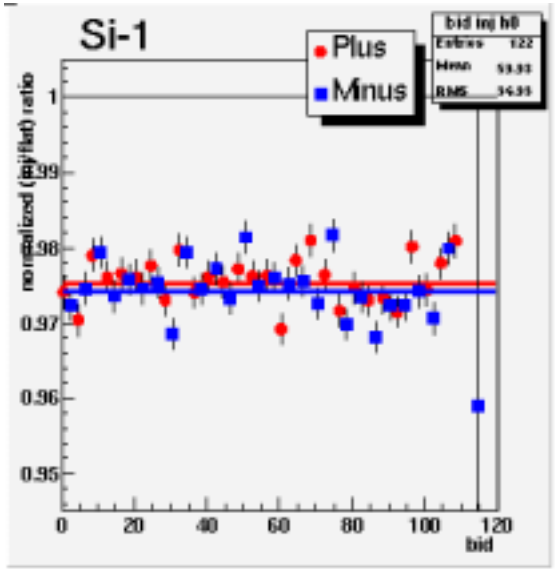


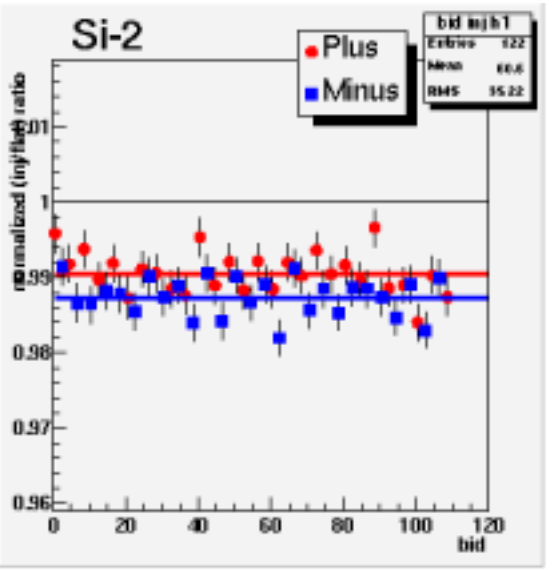


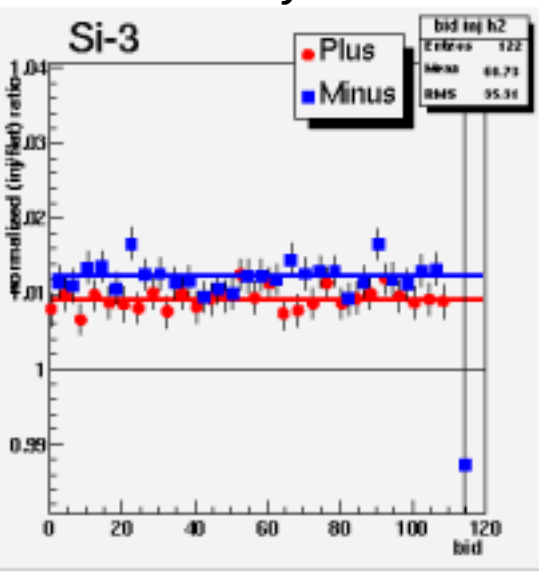


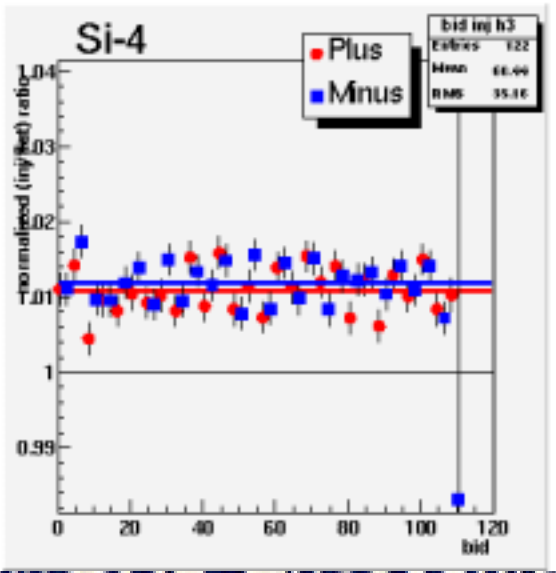
Yellow injection/flattop(1st)

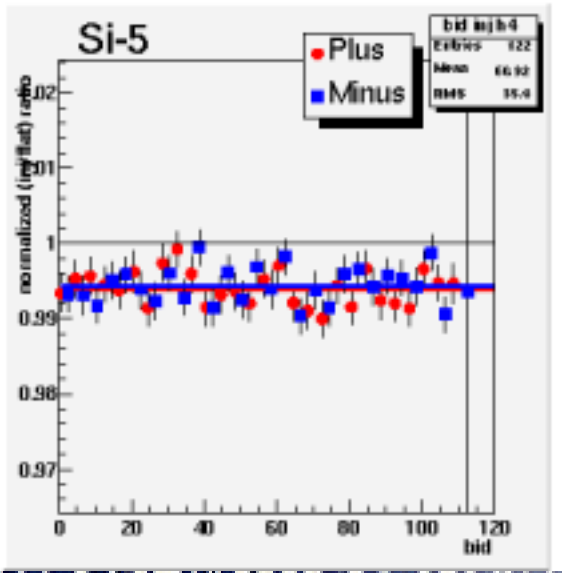
- Vertical 1
- Spin pattern ++--++--
- 11/11 runs
- ***Normalized by total Si***

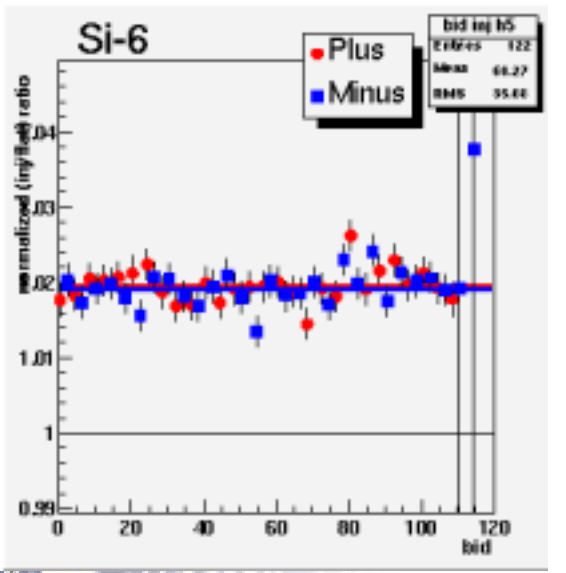






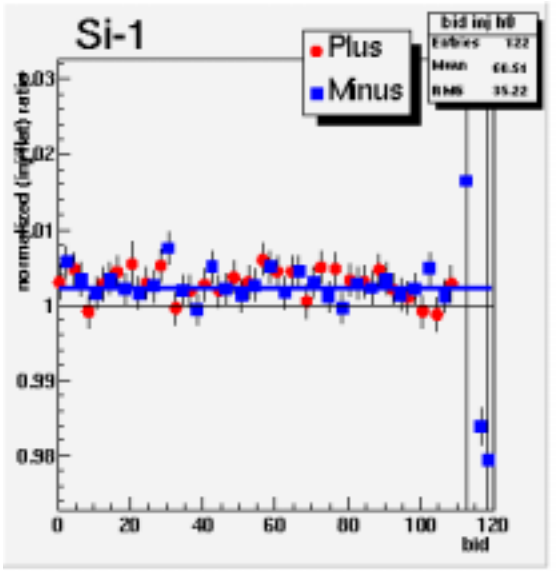


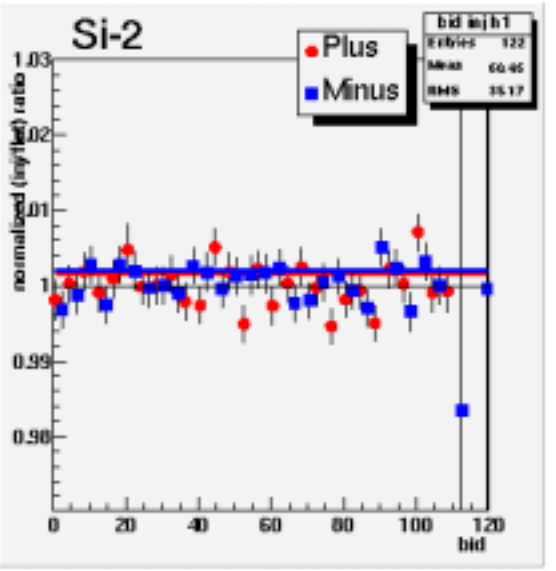


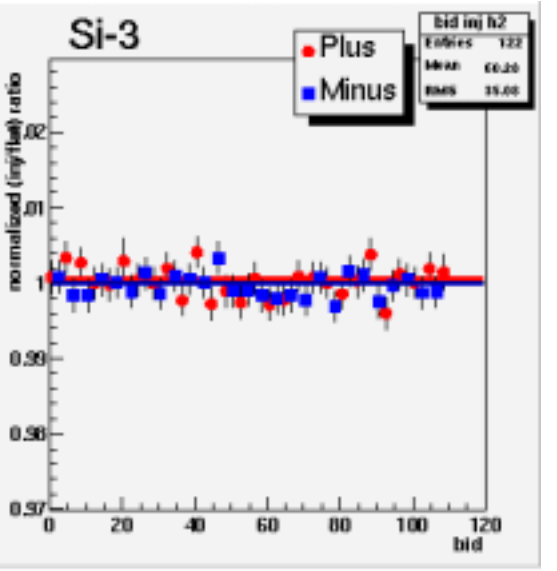


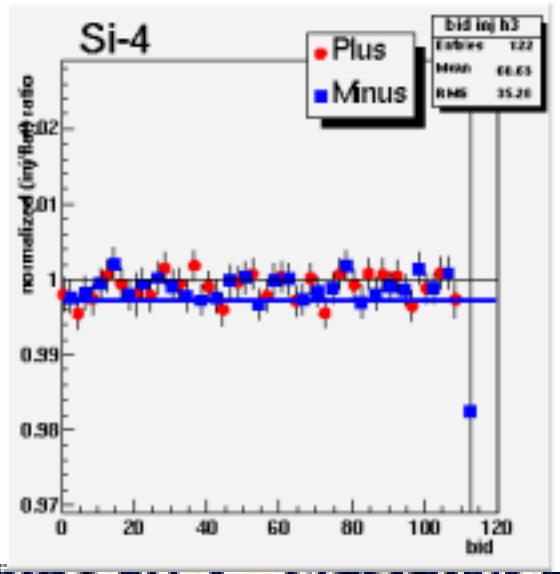
Yellow flattop(1st)/flattop(2nd)

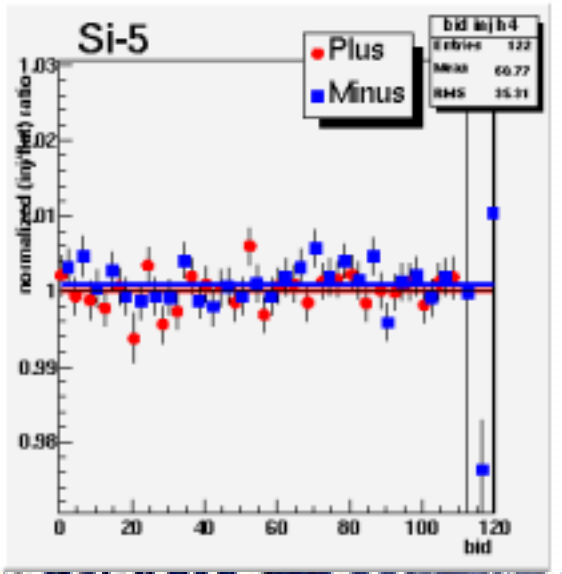
- Vertical 1
- Spin pattern ++--++--
- 10/19 runs
- ***Normalized by Total***

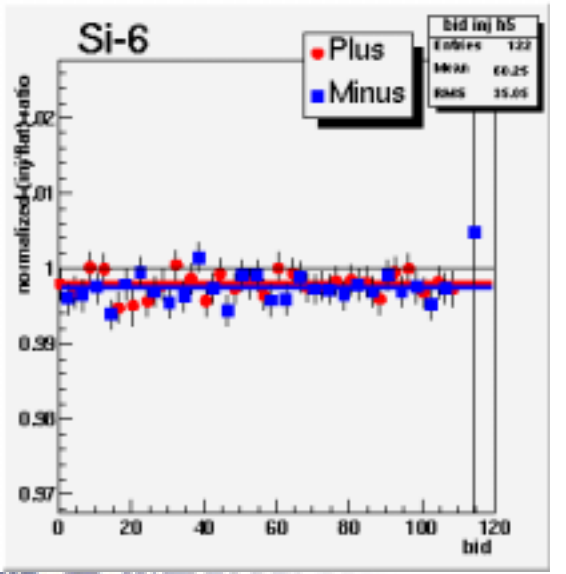












Next things to do for this anomalies

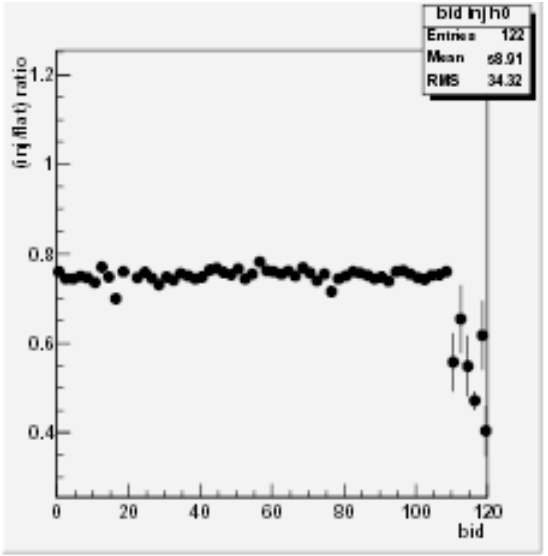
- Continue this study
  - Try different run samples, different spin patterns, different target
  - $1^{st}/3^{rd}$, $1^{st}/4^{th}$ etc.
- Gerry's suggestion
  - See the square formula result for all the combination in 4 x 45 degree detectors
  - 1-3, 1-4, 1-6, 3-4, 3-6 and 4-6 as a function of time
- Documentation
  - Phenix spin PWG wants the quotation for this major systematic error
  - Documentation of few pages will be shown up during next week → distribute to experiments

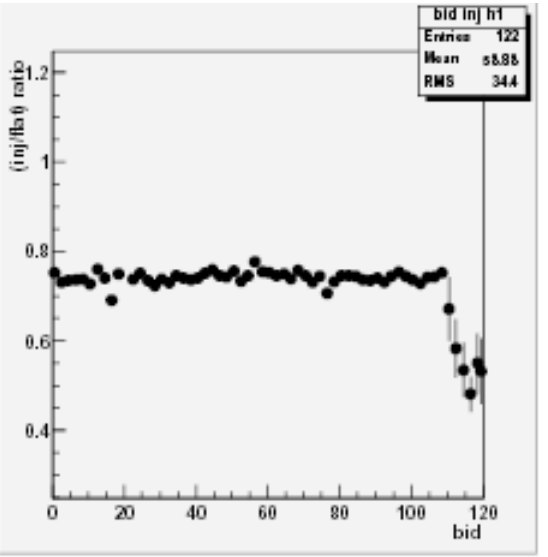
Hardware maintenance and change for RHIC CNI

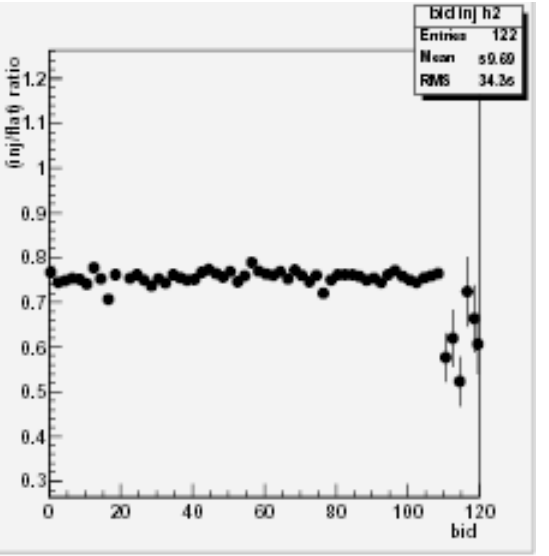
- Replacement of Si's
  - New production @Z.Li, check & test
  - Not necessary but useful if we have another set of flange, or radiation source (not alpha) to check the feed through connection at Si installation
- Calibration source
  - Considering of other low energy source for the reference point
  - 113Sn (IC:365keV,389keV 115d), 207Bi(IC: 482keV,554keV…38y)
- Targets
  - Is it possible to have both arms to be vertical? → problem with vertical profile scan
- WFDs
  - Replacement of memory for all modules (We will bring them to Shatish)
  - Test the USB CAMAC controller (unavailable now)
- Electronics
  - Test those oscillating preamps in lab. Fix or replace them.

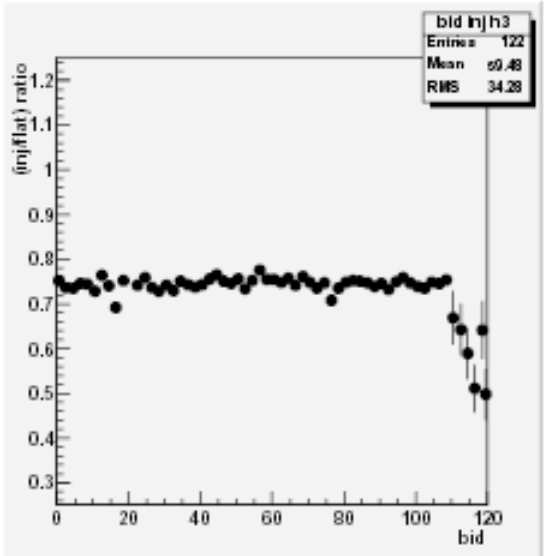
Blue injection/flattop(1st)

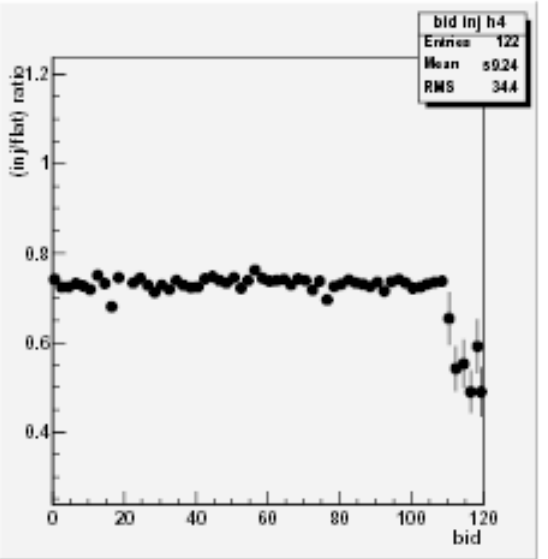
- Vertical 2
- Spin pattern +-+-+-
- 10/10 runs

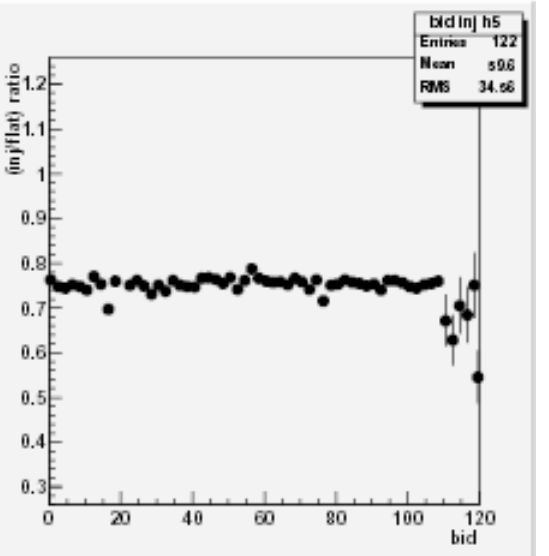








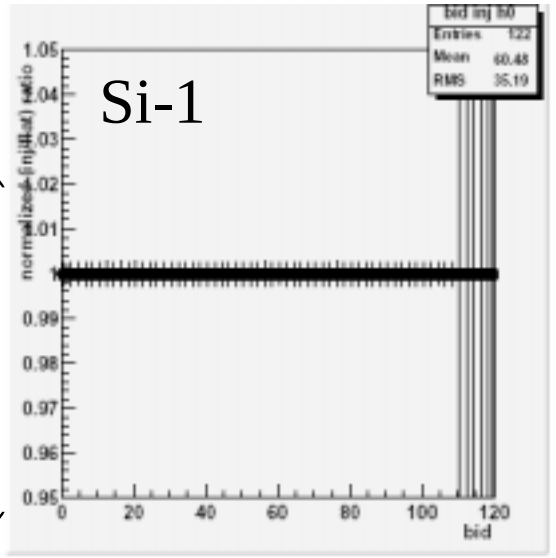


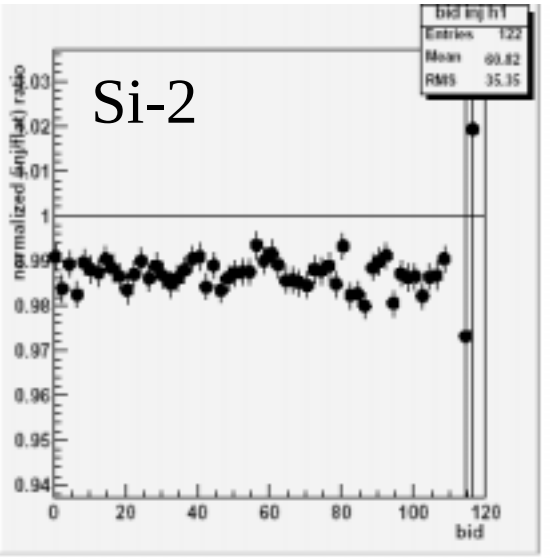


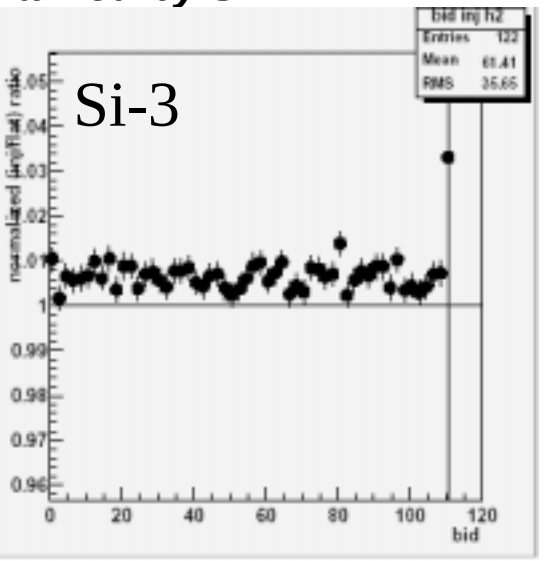
Blue injection/flattop(1st)

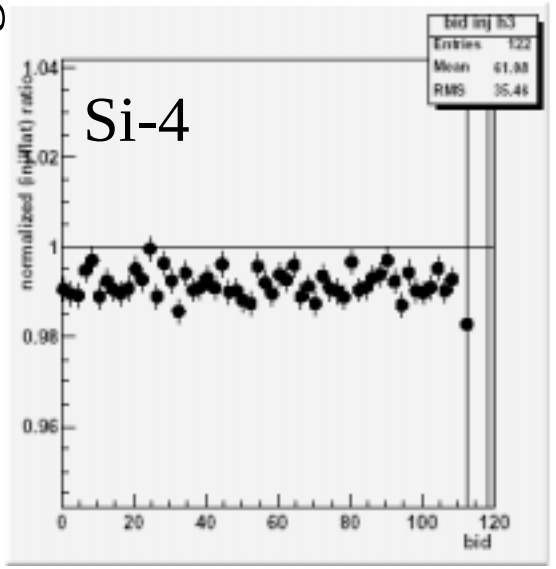
- Vertical 2
- Spin pattern +-+-+-
- 10/10 runs
- ***Normalized by Si-1***

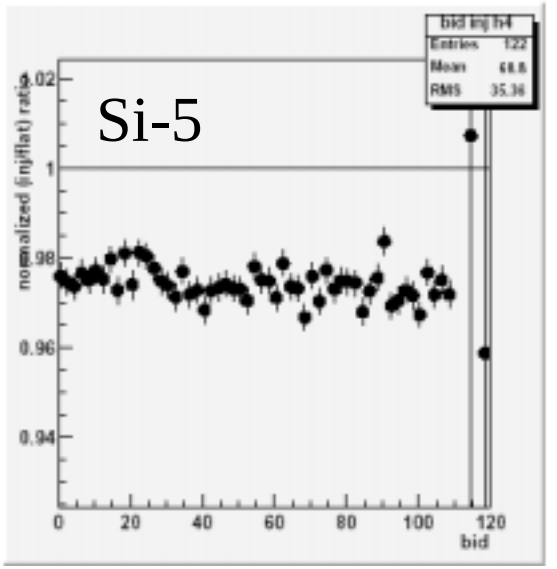
Range (Mean +- 5%)

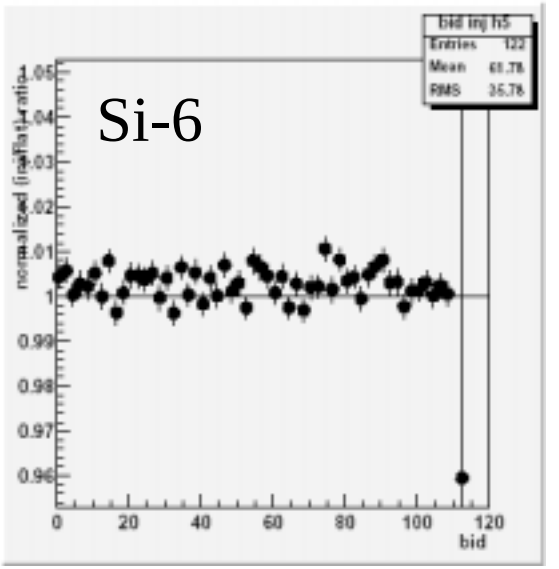






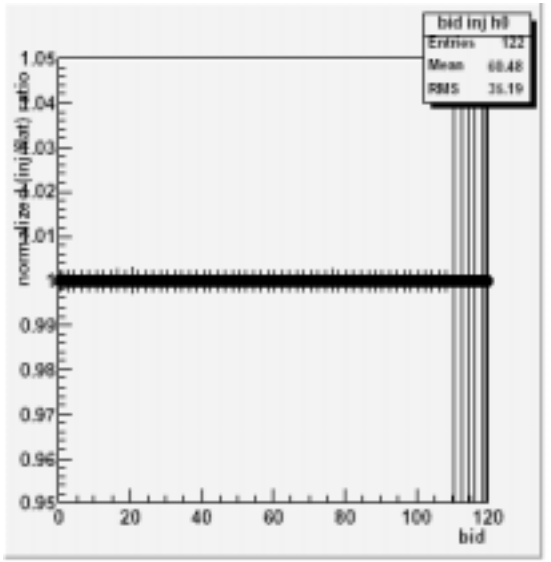


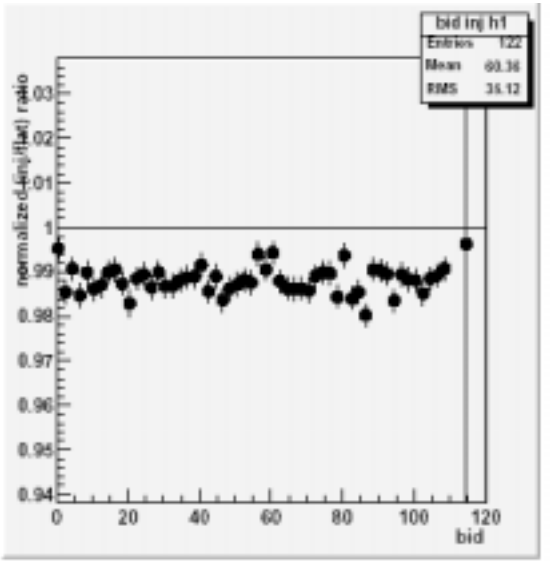


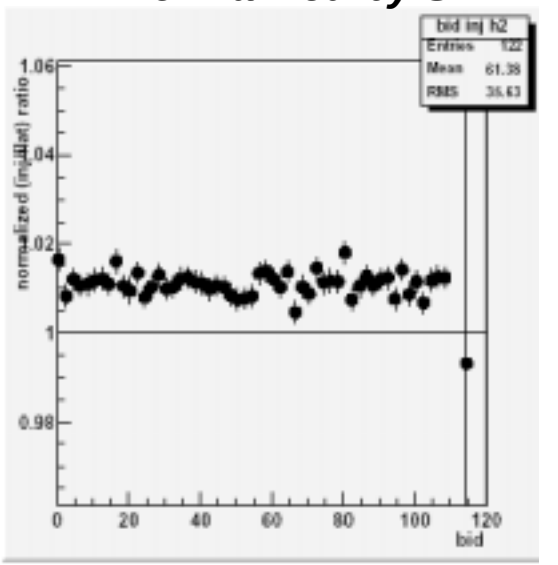


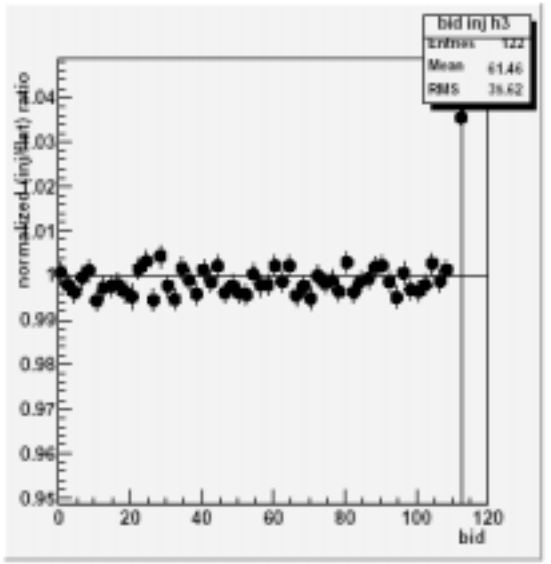
Blue injection/flattop(1st + 2nd)

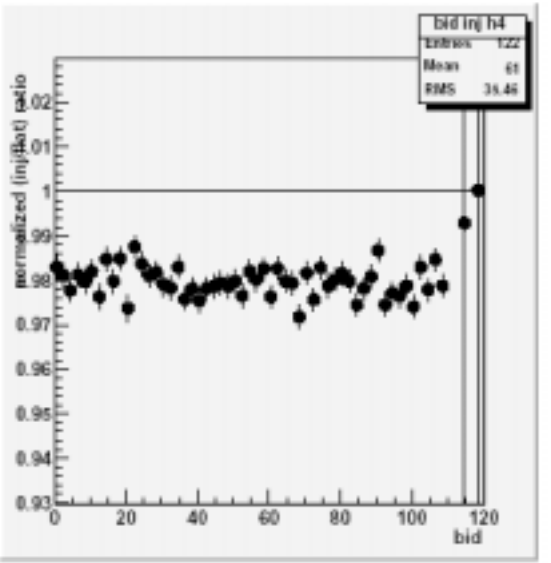
- Vertical 2
- Spin pattern +-+-+-
- 10/19 runs
- ***Normalized by Si-1***

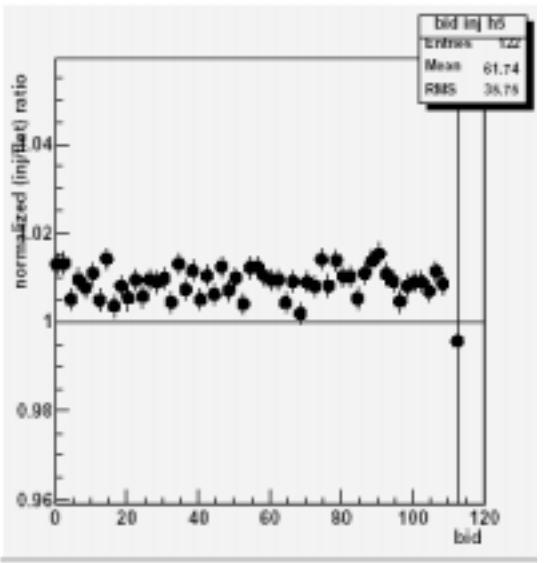






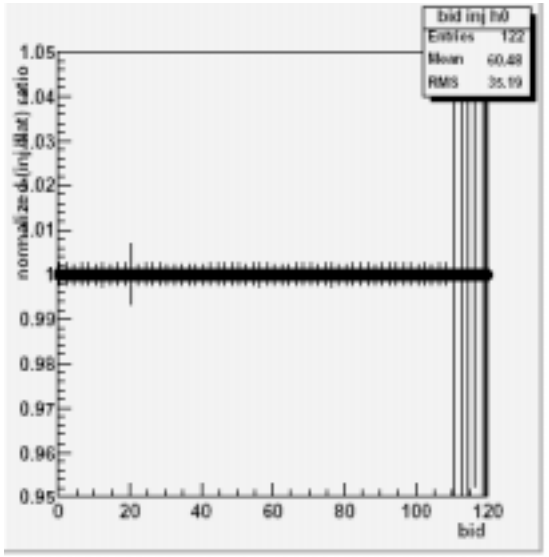


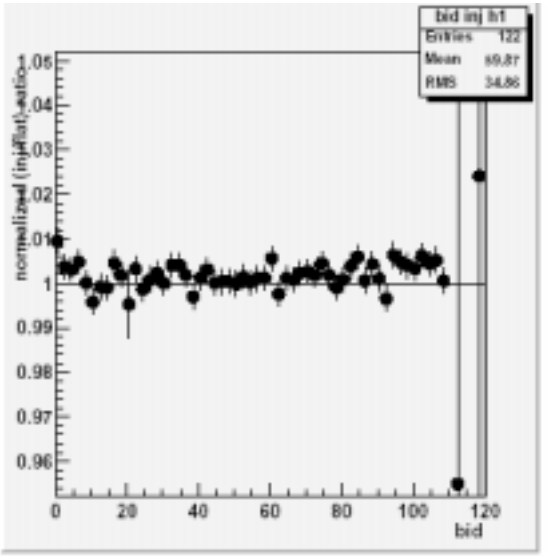


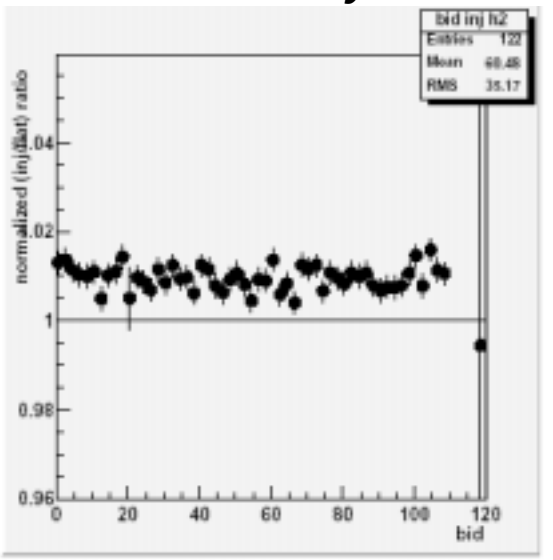


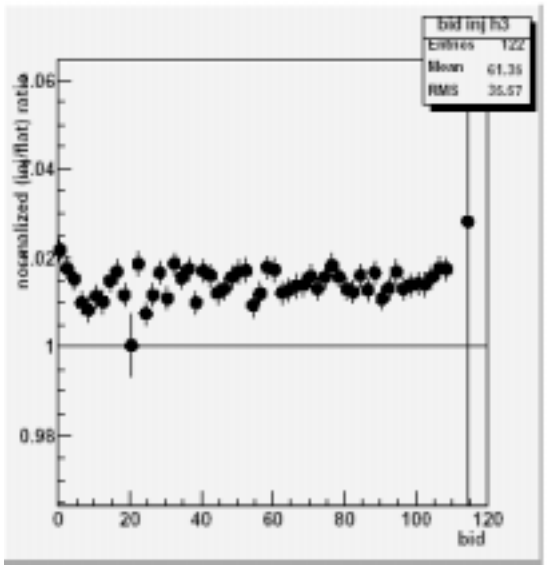
Blue flattop(1st)/flattop(2nd)

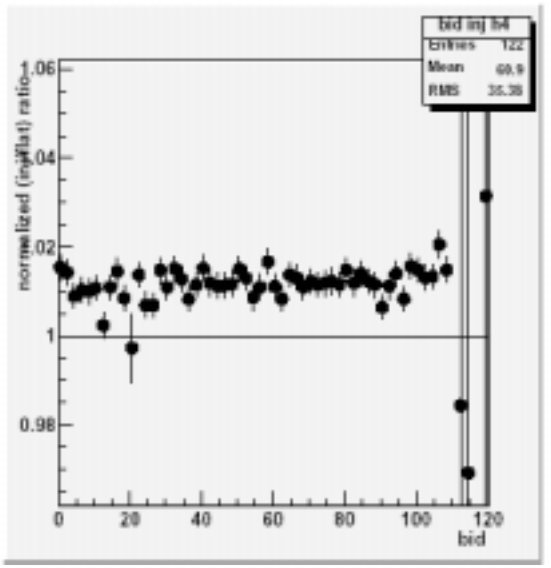
- Vertical 2
- Spin pattern +-+-+-
- 10/19 runs
- ***Normalized by Si-1***

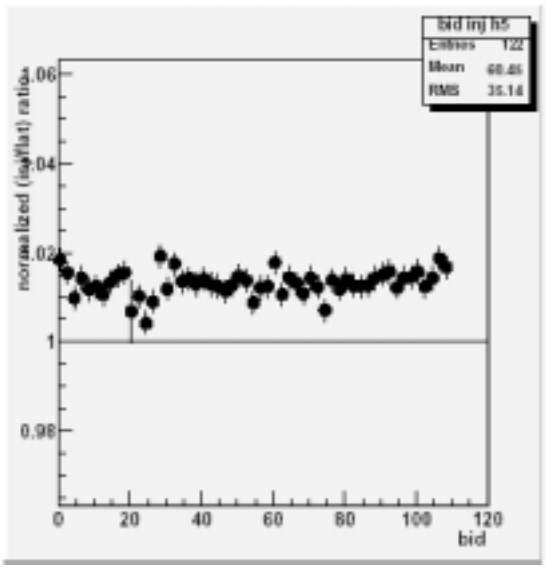






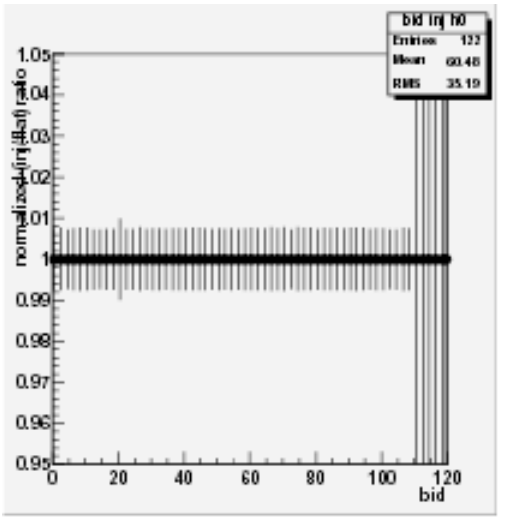


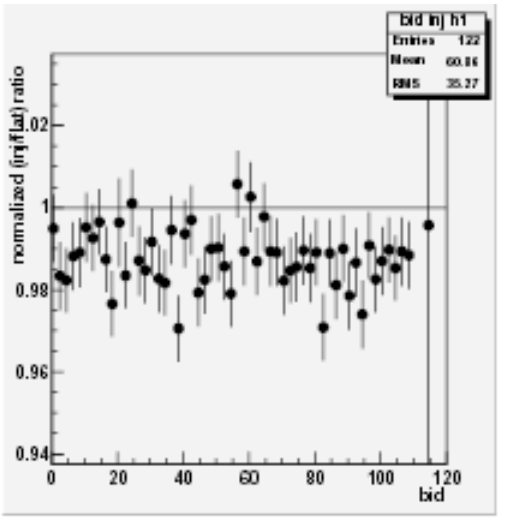


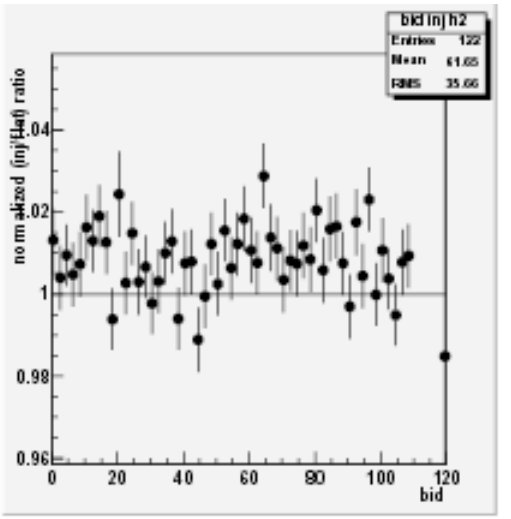


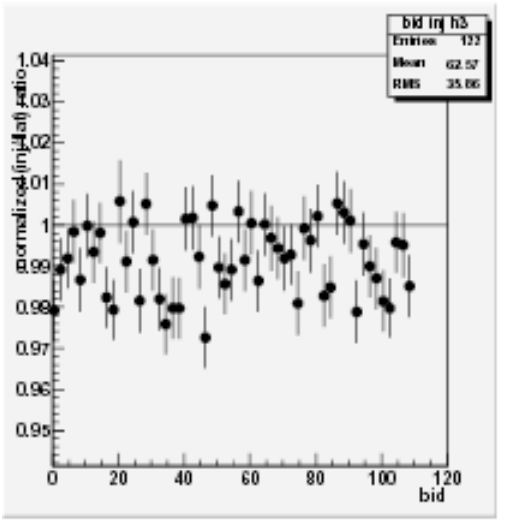
Blue injection/flattop(1st) (one-pair)

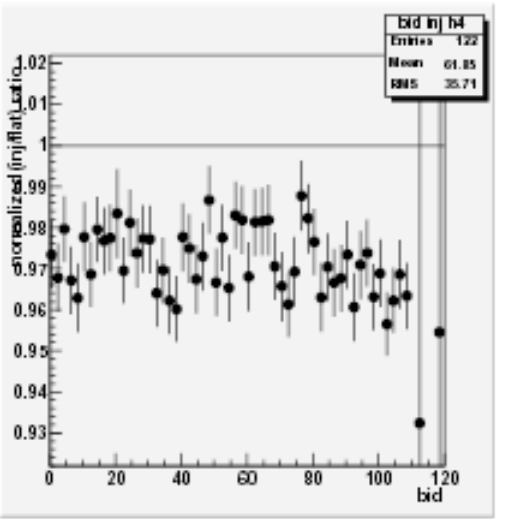
- Statistics is not enough

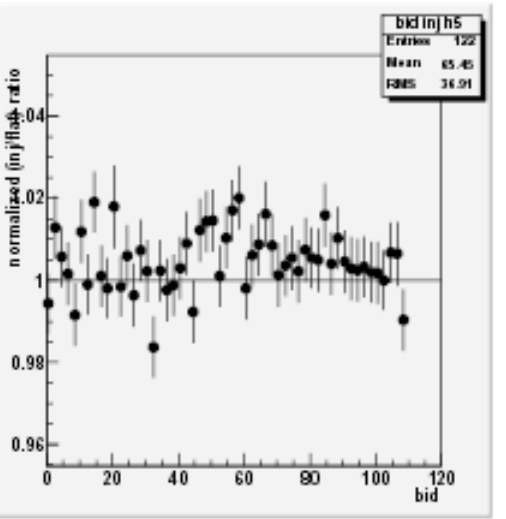






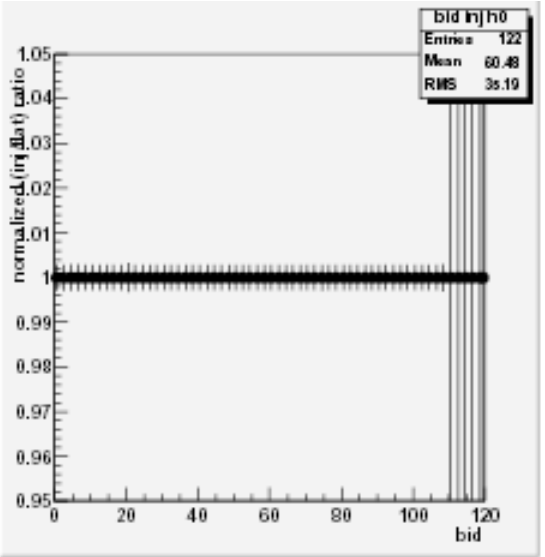


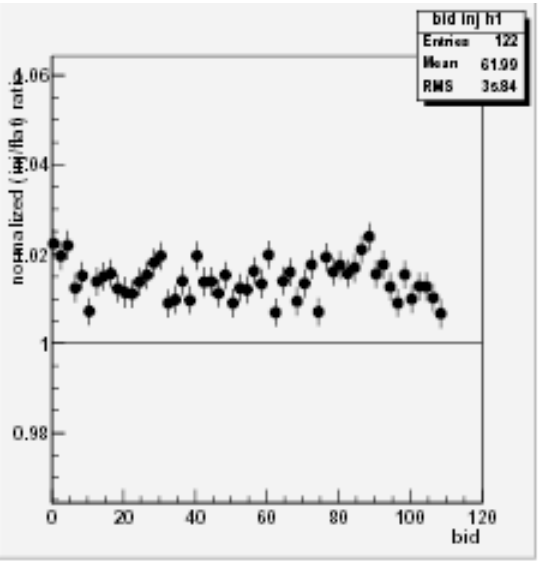


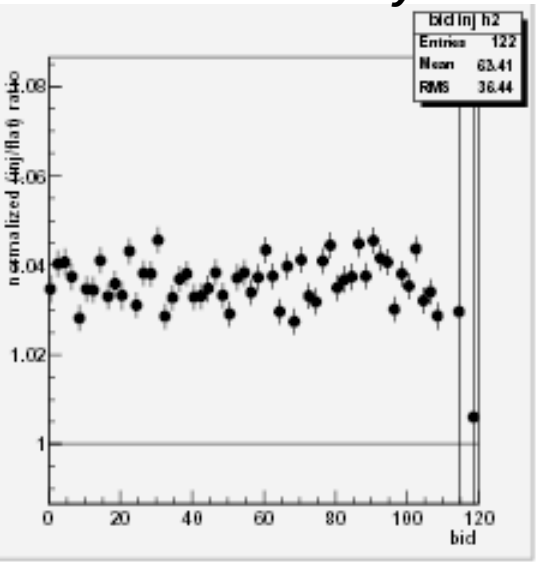


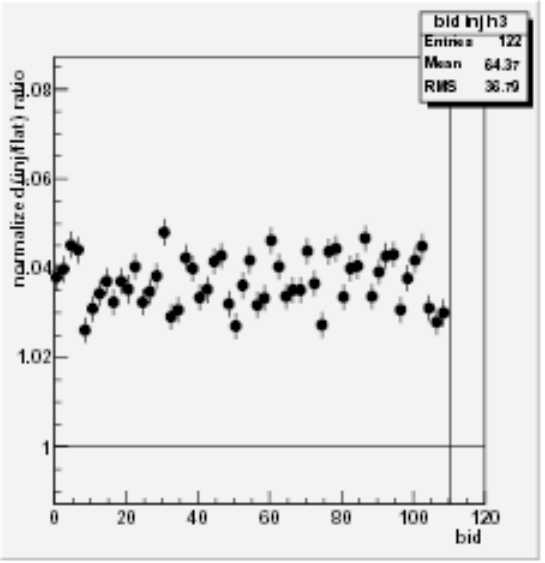
Yellow injection/flattop(1st)

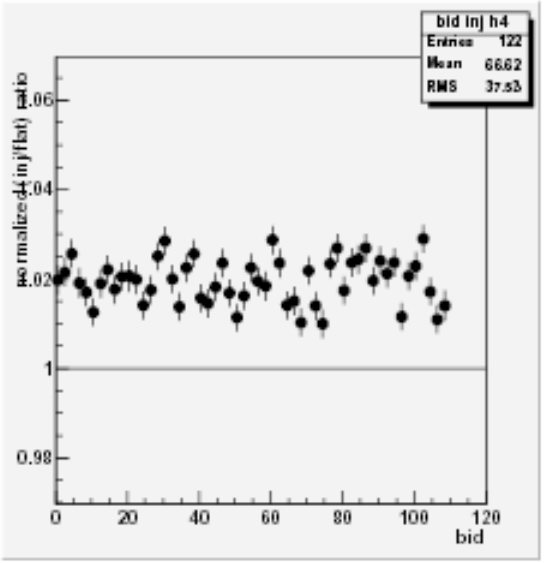
- Vertical 1
- Spin pattern ++--++--
- 11/11 runs
- ***Normalized by Si-1***

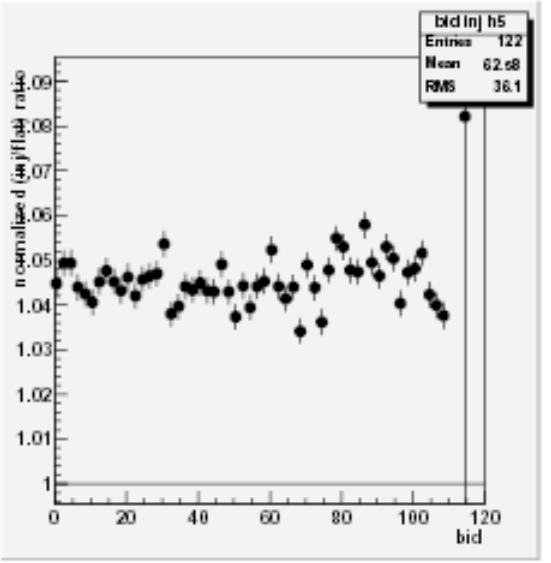












Yellow injection/flattop(1st + 2nd)

- Vertical 1
- Spin pattern ++--++--
- 11/19 runs
- ***Normalized by Si-1***